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FINAL STATUS REPORT

Contract: A Search for N-Type Galaxies

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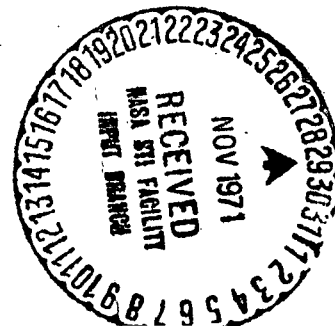
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I. Research Progress

The purpose of this investigation has been to attempt to find intrinsically bright ($M_V < -22$) compact galaxies associated with clusters of galaxies. Such galaxies lie in a transition range between normal bright cluster galaxies and the brightest quasars, and they are therefore important for determining the nature of any possible continuity between these classes of objects. In particular, the spectroscopic study of such bright compact galaxies and the cluster galaxies with which they are found in association can reveal the presence or absence of a so-called 'intrinsic component to the redshift, additional to the normal cosmological redshift.

Previous investigations of this sort have relied on searching for possible clusters of galaxies surrounding known bright compact galaxies and quasars. During the period of the present investigation, this approach has proved to be successful in at least two cases: for Ton 256 and for PKS 2251+11 (Bahcall, Schmidt, and Gunn 1969, and Gunn 1971). The present investigation has sought to invert this procedure, i.e. to examine a large number of distant clusters of galaxies for the presence of a bright compact galaxy or blue stellar object.

A search covering nearly 600 square degrees of sky was undertaken using the blink comparator and glass copies of the National Geographic Society-Palomar Observatory Sky Survey plates at the Kitt Peak National Observatory. Over 50 fields, having right ascensions between 7 hours and 16 hours, were noted as being of possible interest for this investigation. From these, twenty were selected for the observational program: a few objects were later added from the Tonantzintla (Iriarte and

Chavira 1957) and Karl Schwarzschild (Richter and Sahakjan 1965; Richter, Richter, and Schnell 1968) lists of stellar objects with ultraviolet excesses.

The observations consisted of examining these objects for the presence of infrared and ultraviolet excesses, using wide-band filter photography, followed by spectroscopy of the objects that seemed most likely to be extragalactic. The taking of the infrared plates was completed during the spring of 1970. Only a few of the desired ultraviolet plates were obtained; nevertheless, it was decided to proceed with the spectroscopic program on the basis of the available selection data. Observations were hampered by a number of unusually severe winter storms during late 1970 and early 1971, but spectrograms were obtained for a number of objects. Most of the spectrograms were obtained with an image intensifier, and the combination of the intensifier photocathode response and the blaze of the grating employed gave good coverage over the wavelength range from 4500 Å to about 6000 Å, with some response over the range from 4000 Å to 7500 Å. Small-scale non-uniformities in the intensifier response tended to make weak spectral features difficult to detect on unwidened spectra. Of the objects for which detailed observations were planned, 12 are definitely stars, 4 more are probably stars, and 7 have no absorption lines detectable on the present material. Some of this last group may have emission lines, but additional spectroscopic material is needed for confirmation. For three additional objects, neither ultraviolet plates nor spectrograms have yet been obtained.

During the latter part of this investigation, a faint, distant cluster of galaxies was noticed about 3' north-west of

the quasi-stellar radio source 4C 37.43 which has a redshift of 0.370 (Burbidge 1968). A spectrogram of one of the galaxies shows a definite emission line at 6895 \AA ; the galaxy is certainly too distant for this to be $H\alpha$, and the next expected strong emission line is $[O \text{ III}] \lambda 5007$, which would give a redshift of 0.377. No additional emission lines are seen, and the continuum is so weakly recorded that nothing can be said concerning the presence or absence of absorption lines. Further observations are planned for next spring.

II. Personnel

Personnel associated with work under this grant is the following:

Dr. Alan N. Stockton (1/2 time)

III. References:

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